What is claimed is:

1. A method for adjusting the two objective lenses (19, 20) in a 4Pi system of a preferably confocal scanning microscope (1), in which at least one of the objective lenses (19, 20) is movable relative to the other objective lens (20, 19),
wherein a reference object is imaged in the pupils of the objective lenses (19, 20);
a separate Fourier image is formed for each objective lens (19, 20) from the images of the reference object; and
the two Fourier images of the reference object are brought into coincidence by moving at least one of the objective lenses (19, 20) relative to the other.

2. The method as recited in Claim 1,
wherein the Fourier images are recorded by a camera, preferably a CCD camera (32).

3. The method as recited in Claim 2,
wherein the coincidence of the two Fourier images is monitored using the camera images of the Fourier images.

4. The method as recited in Claim 1 or 2,
wherein the camera images of the Fourier images are analyzed using image-processing software.

5. The method as recited in one of Claims 1 through 4,
wherein the coincidence of the two Fourier images is monitored by photodiodes (34, 35) placed in the plane of the Fourier images.

6. The method as recited in Claim 5,
wherein at least one of the objective lenses (19) is moved in a plane orthogonal to the optical axis of the 4Pi system (in the xy-directions) in such a way that a maximum intensity value is reached at each of the two photodiodes (34, 35).

7. The method as recited in Claim 6,
wherein the xy-positions of the objective lenses (19, 20) corresponding to the respective maximum intensity values of the two photodiodes (34, 35) are stored.

8. The method as recited in one of Claims 5 through 7,
wherein at least one of the objective lenses (19) is moved in the direction of the optical axis of the 4Pi system (in the z-direction) in such a way that the sum signal of the photodiodes (34, 35) reaches a maximum intensity value.

9. The method as recited in Claim 8,
wherein the z-positions of the objective lenses (19, 20) corresponding to the maximum of the sum signal of the two photodiodes (34, 35) are stored.

10. The method as recited in one of Claims 5 through 9,
wherein the measurement is automatically interrupted when the signal intensities of the photodiodes (34, 35) deviate from the maximum values.

11. The method as recited in one of Claims 5 through 10,
wherein the objective lens (19) is automatically readjusted when the signal intensities of the photodiodes (34, 35) deviate from the maximum values.

12. The method as recited in one of Claims 3 through 11,
wherein the monitoring of the Fourier images and, possibly, the readjustment of the objective lens (19) is/are cyclically repeated at regular intervals during a measurement.

13. The method as recited in one of Claims 6 through 12,
wherein the movements performed by the objective lens (19) during a measurement are logged.

14. A device for adjusting the two objective lenses (19, 20) in a 4Pi system of a preferably confocal scanning microscope, in which at least one of the objective lenses (19, 20) is movable relative to the other objective lens (20, 19), in particular for carrying out a method according to one of the Claims 1 through 13,
wherein an illumination device and optical incoupling means are provided for imaging a reference object in the pupils of the objective lenses (19, 20);
a separate Fourier image can be formed for each objective lens (19, 20) from the images of the reference object; and

the two Fourier images of the reference object can be brought into coincidence by moving at least one of the objective lenses (19, 20) relative to the other.

15. The device as recited in Claim 14,
wherein the reference object has a two-dimensional structure.

16. The device as recited in Claim 15,
wherein the reference object takes the form of a cross-shaped aperture (23).

17. The device as recited in one of Claims 14 through 16,
wherein the reference object is provided outside the 4Pi system.

18. The device as recited in one of Claims 14 through 17,
characterized by an illumination device in the form of a laser light source (24).

19. The device as recited in one of Claims 14 through 18,
characterized by incoupling means in the form of a beam splitter cube (27) and a lens (28).

20. The device as recited in Claim 19,
wherein the reference object is located directly on the side of the beam splitter cube (27) facing the illumination device.

21. The device as recited in one of Claims 14 through 20,
characterized by a lens (31) for imaging the Fourier images onto a camera, preferably onto a CCD camera (32).

22. The device as recited in one of Claims 14 through 21,
wherein photodiodes (34, 35) are placed in the plane (33) of the Fourier images.

23. The device as recited in Claim 22,
wherein the photodiodes (34, 35) are disposed in the higher-order space of the Fourier images.

24. The device as recited in Claim 23,

wherein two photodiodes (34, 35) are disposed in accordance with the two-dimensional structure of the reference object in such a way that one photodiode (34, 35) detects the vertical (x) patterns and the other photodiode (34, 35) detects the horizontal (y) patterns of the Fourier images.

25. The device as recited in one of Claims 14 through 24, wherein piezoelectric actuators are provided for moving the objective lens (19).

26. The device as recited in Claim 25, wherein the piezoelectric actuators are controllable as a function of the signal intensities of the photodiodes (34, 35) and/or as a function of evaluation data from the image-processing software.